CLAIMS

1. A photo radiation intensity sensor (1) comprising a housing (2) having a transparent or translucent portion (4), and a printed circuit board (7) placed in such way in the housing (2) that one of its edges (37) faces the transparent or translucent portion (4), where at least a first and a second sensing element (5a, 5b) sensitive to radiation are placed at a first side (7') of the printed circuit board (7), where the first and second sensing elements (5a, 5b) are separated by a first flange (8), serving as a shading element, characterised in that at least a third sensing element (5'; 5c) sensitive to radiation is placed at a second side (7") of the printed circuit board (7), where said sensing elements (5a, 5b, 5'; 5c) are arranged to detect both the direction and the intensity of the radiation source and for producing output signals which are used for estimating the sun radiation heating impact, and where the printed circuit board (7) is arranged in such a way that it functions as a shading element between the areas on its first (7') and second (7") side where the sensing elements (5a, 5b, 5'; 5c) are mounted.

2. A photo radiation intensity sensor according to claim 1, characterized in that a fourth sensing element (5d) is placed at the second side (7") of the printed circuit board (7), where the third (5c) and fourth (5d) sensing elements are separated by a second flange (9), serving as a shading element.

3. A photo radiation intensity sensor according to any one of the claims 1 or 2, characterized in that the housing (2) comprises a chamber (36) containing a diffusive compound (35) that is a potting, which compound (35) is positioned between said housing (2) and said at least one sensing element (5a, 5b, 5'; 5c, 5d).

4. A photo radiation intensity directional sensor according to any one of the preceding claims, c h a r a c t e r i z e d i n that the shading elements (7, 8, 9) are arranged to prevent exposure of radiation to the sensing elements (5a, 5b, 5'; 5c, 5d) which are separated by the shading elements (7, 8, 9), to a degree depending on the position of the photo radiation intensity directional sensor (1) in relation to a source of photo radiation, said shading elements (7, 8, 9) are thereby arranged for creating differences in output amplitudes from the sensing elements (5a, 5b, 5'; 5c, 5d), which difference in amplitude is used for estimating the position of the source of radiation.

5. A photo radiation intensity directional sensor according to any one of the claims 3 or 4, c h a r a c t e r i z e d i n that the shading elements (7, 8, 9) divide said chamber (36) into at least three sub compartments, each containing one or several sensing elements (5a, 5b, 5'; 5c, 5d).

6. A photo radiation intensity directional sensor according to claim 5, c h a r a c t e r i z e d i n that the chamber (36) includes a top region (39) forming part of said at least three sub compartments (12, 13; 25, 26), where said top region (39) is vertically arranged in relation to said shading elements (7, 8, 9) such that said shading elements (7, 8, 9) do not prevent photo radiation from impinging on at least a portion of each sub compartment (12, 13; 25, 26) in said top region (39).

7. A photo radiation intensity directional sensor according to claim 6, c h a r a c t e r i z e d i n that said top region (39) is positioned vertically above said shading elements (7, 8, 9).

8. A photo radiation intensity directional sensor according to any one of the claims 5 or 6, characterized in that said chamber (36) includes a bottom region (46) forming part of said at least three sub compartments (12, 13; 25, 26), where said bottom region (46) is vertically arranged below an upper edge (37, 38) of each of said shading elements (7, 8, 9).

9. A photo radiation intensity directional sensor according to any one of the preceding claims, characterized in that said sensing elements (5a, 5b, 5'; 5c, 5d) are positioned inside said chamber (36) and being exposed to said diffusive compound (35).

10. A photo radiation intensity directional sensor according to any one of the preceding claims, characterized in that said compound (35) is arranged to preserve said sensing elements (5a, 5b, 5'; 5c, 5d) from oxidizing.

11. A photo radiation intensity directional sensor according to any one of the claims 2-10, characterized in that the printed circuit board (7) carries further electronic circuits, and is positioned at least partly inside said chamber (36) such that said electronic circuits and sensing elements (5a, 5b, 5'; 5c, 5d) are protected from negative influence on the environment by the diffusive compound (35).

12. A photo radiation intensity directional sensor according to any of the preceding claims, characterized in that said photo radiation intensity sensor includes a radiation filter transparent to a defined frequency interval, which radiation filter is arranged to block radiation outside said frequency interval from impinging on said sensing elements.

13. A photo radiation intensity directional sensor according to claim 12, c h a r a c t e r i z e d i n that said radiation filter is constituted by said compound (35).

14. A photo radiation intensity directional sensor according to claim 12, c h a r a c t e r i z e d i n that said radiation filter is constituted by a lens element (4).

15. A photo radiation directional intensity sensor according to any of the preceding claims, c h a r a c t e r i z e d i n that said sensing elements (5a, 5b, 5'; 5c, 5d) are sensitive to infrared and/or visible light.

16. A photo radiation directional intensity sensor according to any of the preceding claims, c h a r a c t e r i z e d i n that said diffusive compound (35) is a liquid or a gel.

17. A photo radiation directional intensity sensor calibration method, comprising the steps:
rotating the sensor (1) 360° in azimuth and from 0° to 90° in elevation under a fixed light source, which rotation takes place in predetermined steps;
measuring all the azimuth steps for each elevation step, where each measurement results in a value from each sensing element (5a, 5b, 5'; 5c, 5d) that is part of the sensor (1);
saving the acquired data amount in the form of tables and comparing with those of an ideal solar sensor; and
calculating correction coefficients from this comparison.

18. Calibration method according to claim 18, c h a r a c t e r i z e d i n that tables containing these correction

coefficients, which tables are converted into graphs, are stored in a digital memory for every individual solar sensor.

19. A photo radiation directional intensity sensor measuring method for a sensor having at least two sensing elements, comprising the steps:

measuring the output values U1, U2, U3, U4 from each sensing element (5a, 5b, 5'; 5c, 5d), and saving the measurement values to a digital memory;

calculating an average value U_{avg} of the signal acquired from the sensing elements (5a, 5b, 5'; 5c, 5d), which average value U_{avg} is proportional to the intensity of the detected radiation;

calculating differences between output signals of opposite sensing elements (5a, 5b; 5'; 5c, 5d);

calculating normalized values p and q of the above differences by dividing them with U_{avg};

calculating a first azimuth angle value $A_z = C_1 \arctan(p/q)$, where C_1 is a constant;

calculating a corrected azimuth angle value, using the calculated first azimuth value A_z and correction coefficients;

calculating a first elevation angle value $E = C_2\sqrt{p^2+q^2}$ where C_2 is a constant;

calculating a corrected elevation angle value, using the calculated first elevation angle value E and correction coefficients;

calculating a first intensity value $I = C_3U_{avg}$ where C_3 is a constant; and calculating a corrected intensity value, using the calculated first intensity value E and correction coefficients.

20. Measuring method according to claim 20, characterized in that the correction coefficients are those which are determined according to any one of the claims 18 or 19.